

REMARKS

Applicants concurrently file herewith a Petition and Fee for One-month Extension of Time.

Claims 12-32 are all the claims presently pending in the application.

Claims 12-14, 18-21, and 27-30 stand rejected on the grounds of nonstatutory obviousness-type double patenting as being allegedly unpatentable over claims 1-3 of Matsui et al. (U.S. Patent No. 6,751,855 B2). Claims 15-17, 22-26, 31, and 32 stand rejected on the grounds of nonstatutory obviousness-type double patenting as being allegedly unpatentable over claims 1-3 of Matsui in view of Yamazaki et al. (Japan Publication No. 11-293365).

With respect to the prior art rejections, claims 12, 18-22, 29, 30, and 32 stand rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over Ichikawa et al. (Japan Publication No. 2000-169918) in view of Mae et al. (Japan Publication No. 07-214232). Claims 13, 14, 23, 24, 27, and 28 stand rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over Ichikawa in view of Mae, and further in view of Komata (Japan Publication No. 57-070244). Claims 15-17, 25, 26, and 31 stand rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over Ichikawa in view of Mae, and further in view of Yamazaki.

These rejections are respectfully traversed in the following discussion.

I. THE CLAIMED INVENTION

An exemplary aspect of the claimed invention (e.g., as recited in claim 12) is directed to a process for producing an ultrafine copper alloy wire, including melting a high-purity copper having a total unavoidable impurity content of not more than 1 ppm by mass in a carbon crucible installed in a vacuum, replacing an atmosphere surrounding the melted copper by an argon gas atmosphere and adding 1.0 to 5.0% by mass of silver having a purity of not less than 99.99% by

mass to the copper, casting the copper with silver added thereto in a carbon mold into a wire rod, and drawing the wire rod to a diameter of not more than 0.08 mm.

Conventional ultrafine wires are manufactured to be used in conventional cables having standard diameters in order to include an increased amount of wire cores in conventional cables. However, conventional ultrafine wires have had significant issues with breakage, specifically as a result of foreign material inclusion and ductile fracture. Some conventional ultrafine wires have attempted to solve this problem by limiting the amount of foreign material which makes up the wires. However, even when foreign materials in conventional ultrafine wires are limited to a certain amount, wire breakage during wire drawing still occurs when the amount of foreign materials included in the conventional wires comes close to the limited amount (Application at page 1, line 17 to page 3, line 24).

An exemplary aspect of the claimed invention, on the other hand, is characterized by the following exemplary features included at page 9, lines 11-21 of the present specification:

1. the purity of copper (Cu) and silver (Ag) are respectively 99.999% or more (high-purity copper having a total unavoidable impurity content of not more than 1 ppm by mass) and 99.99% or more;
2. the melting of the high purity copper is conducted in vacuum and the casting of the copper with silver is conducted in an argon gas atmosphere; and
3. the melting of the high purity copper is conducted by using a carbon crucible and the casting of the copper with silver is conducted by using a carbon mold.

These exemplary features are not taught or suggested by any of the prior art of record, either alone or (arguendo) in combination, and may provide a process for producing an ultrafine copper alloy wire in which the resultant ultrafine copper alloy wire possesses excellent tensile strength, wire drawing properties, and bending properties (Application at page 7, lines 17-20).

II. THE NONSTATUTORY OBVIOUSNESS-TYPE DOUBLE PATENTING REJECTIONS

Matsui discloses a process for forming an ultrafine copper alloy wire (Matsui at Abstract). The Examiner alleges that claims 1-3 of Matsui make the claimed invention obvious. The Examiner also alleges that claims 1-3 of Matsui make the claimed invention obvious in view of Yamazaki.

However, Applicants respectfully submit that claims 1-3 of Matsui clearly fail to teach or suggest a process for producing an ultrafine copper alloy wire, “comprising . . . melting a high-purity copper having a total unavoidable impurity content of *not more than 1 ppm by mass in a carbon crucible installed in a vacuum*”, as recited, for example, in claim 12 (Application at page 9, lines 11-21). Indeed, claims 1-3 of Matsui clearly teach an alloy requiring “a *copper matrix* of high purity copper with a total unavoidable impurity content of *not more than 10 mass ppm*”, while subsequently requiring a completely different mass percentage of silver in the alloy.

In addition, Yamazaki clearly fails to make up for the deficiencies of claims 1-3 of Matsui. The Examiner applies Yamazaki to teach the removal of foreign matter with acid solution (Office Action at page 5, last paragraph). However, Yamazaki clearly fails to teach or suggest that the purity of copper (Cu) and silver (Ag) are respectively 99.999% or more (high-purity copper having a total unavoidable impurity content of not more than 1 ppm by mass) and 99.99% or more.

Therefore, Applicants respectfully request the Examiner to reconsider and withdraw this rejection.

III. THE PRIOR ART REJECTIONS

A. The Alleged Ichikawa and Mae Combination

Ichikawa discloses a method for producing an extra-thin wire having high strength (Ichikawa at Abstract). Mae discloses the production of a high-purity copper ingot (Mae at

Abstract), and teaches that a high purity copper (purity of 6N: 99.9999% or more) is melted by using a carbon crucible in a vacuum, and that the copper melt is cast by using a carbon nozzle and carbon mold. The Examiner alleges that the combination of Ichikawa and Mae would make the claimed invention obvious.

However, Applicants respectfully submit that one of ordinary skill in the art would not have combined Ichikawa and Mae to arrive at the claimed invention. Ichikawa and Mae are directed toward two completely different objects and, thus, cannot be combined successfully. The features of Mae that the Examiner combines with Ichikawa would make Ichikawa inoperable and would require a radical change in the design of Ichikawa, and, thus, it would not have been predictable for one of ordinary skill in the art to have made such a combination.

Further, even assuming (arguendo) that one of ordinary skill in the art would combine Ichikawa and Mae, the resultant combination does not teach or suggest every feature of the claimed invention. Specifically, Ichikawa and Mae – either alone or (arguendo) in combination with one another – clearly fail to teach or suggest all of the aforementioned exemplary features of the claimed invention.

Clearly, Ichikawa fails to teach or suggest any of the following exemplary features:

1. the purity of copper (Cu) and silver (Ag) are respectively 99.999% or more (high-purity copper having a total unavoidable impurity content of not more than 1 ppm by mass) and 99.99% or more;
2. the melting the high purity copper is conducted in vacuum and the casting the copper with silver is conducted in an argon gas atmosphere; and
3. the melting the high purity copper is conducted by using a carbon crucible and the casting the copper with silver is conducted by using a carbon mold.

However, while the Examiner alleges that Mae teaches “conventional steps of forming high purity copper alloy wire products including casting allow in non-oxidizing atmosphere”

(Office Action at page 3, first paragraph), Mae clearly fails to teach or suggest the process of manufacturing the copper based alloy of the claimed invention. Further, Mae is silent to the replacement of the vacuum with the argon gas atmosphere for adding the alloy element (such as silver). Indeed, the mention of the replacement of the claimed invention is nowhere to be found in either Ichikawa or Mae.

Accordingly, even assuming (arguendo) one of ordinary skill in the art would combine Ichikawa and Mae, the resultant combination merely provides the use of the vacuum at the melting step of the copper in the process of manufacturing Cu-Ag alloy wire. Thus, it would not have been obvious to one having ordinary skill in the art to replace the vacuum with the argon gas atmosphere when adding the silver to the copper melt as is included in the claimed invention. Further, it would not have been obvious to change the processing atmosphere from the vacuum to the argon gas in accordance with the claimed invention.

Therefore, since the claimed invention is clearly patentable over the alleged Ichikawa and Mae combination, Applicants respectfully request the Examiner to reconsider and withdraw this rejection, including those rejections applied to the invention of claims 18-22, 29, 30, and 32.

B. The Komata Reference

To make up for the deficiencies of the alleged Ichikawa and Mae combination, the Examiner applies Komata. Komata discloses a Cu-based alloy including a Cu-Ag alloy and Mg or In (Komata at Abstract). The Examiner alleges that the combination of Ichikawa, Mae, and Komata makes the claimed invention obvious.

However, Applicants respectfully submit that one of ordinary skill in the art would not have combined Ichikawa, Mae, and Komata to arrive at the claimed invention. Regardless of the application of Komata to the aforementioned combination of section A, Ichikawa and Mae are directed to two completely different objects and, thus, cannot be combined successfully. The

features of Mae that the Examiner combines with Ichikawa would make Ichikawa inoperable and would require a radical change in the design of Ichikawa, and, thus, it would not have been predictable for one of ordinary skill in the art to have made such a combination.

Further, even assuming (arguendo) that one of ordinary skill in the art would combine Ichikawa, Mae, and Komata, the resultant combination does not teach or suggest every feature of the claimed invention. Specifically, Komata, like Ichikawa and Mae, clearly fails to teach or suggest all of the following exemplary features of the claimed invention:

1. the purity of copper (Cu) and silver (Ag) are respectively 99.999% or more (high-purity copper having a total unavoidable impurity content of not more than 1 ppm by mass) and 99.99% or more;
2. the melting of the high purity copper is conducted in vacuum and the casting of the copper with silver is conducted in an argon gas atmosphere; and
3. the melting of the high purity copper is conducted by using a carbon crucible and the casting of the copper with silver is conducted by using a carbon mold.

Additionally, the invention of claims 13 and 14 are characterized by the following exemplary feature:

4. Magnesium (Mg: purity of 99.9% or more) or indium (In: purity of 99.99% or more) is added as a second alloy element.

Regarding claims 13 and 14, the Examiner alleges that Komata teaches Mg and In “are known optional elements for wires to improve corrosion” (Office Action at page 3, last paragraph).

However, Komata teaches the process of manufacturing the copper based alloy, in which Cu is melted by using a carbon crucible, and a melt surface is covered with charcoal powder. Thereafter, respective additive elements are introduced into the melt and the copper melt is cast (Page 2, left upper column, lines 7 to 20). Since the melting and casting of the claimed invention

are not taught or suggested by Komata, both the invention of claims 13 and 14 and the claimed invention would have not been realized by the alleged Ichikawa, Mae, and Komata combination. Thus, Komata fails to make up for the deficiencies of the alleged Ichikawa and Mae combination features in Section A.

Therefore, Applicants respectfully request the Examiner to reconsider and withdraw this rejection, including those rejections applied to the invention of claims 23, 24, 27, and 28.

C. The Yamazaki Reference

To make up for the deficiencies of the alleged Ichikawa and Mae combination, the Examiner applies Yamazaki. Yamazaki discloses a super-fine conductor containing foreign matters of specified diameters (Yamazaki at Abstract). The Examiner alleges that the combination of Ichikawa, Mae, and Yamazaki makes the claimed invention obvious.

However, Applicants respectfully submit that one of ordinary skill in the art would not have combined Ichikawa, Mae, and Yamazaki to arrive at the claimed invention. Regardless of the application of Yamazaki to the aforementioned combination of section A, Ichikawa and Mae are directed to two completely different objects and, thus, cannot be combined successfully. The features of Mae that the Examiner combines with Ichikawa would make Ichikawa inoperable and would require a radical change in the design of Ichikawa, and, thus, it would not have been predictable for one of ordinary skill in the art to have made such a combination.

Further, even assuming (arguendo) that one of ordinary skill in the art would combine Ichikawa, Mae, and Yamazaki, the resultant combination does not teach or suggest every feature of the claimed invention. Specifically, Yamazaki, like Ichikawa and Mae, clearly fails to teach or suggest all of the following exemplary features of the claimed invention:

1. the purity of copper (Cu) and silver (Ag) are respectively 99.999% or more (high-purity copper having a total unavoidable impurity content of not more than 1 ppm by mass) and 99.99% or more;
2. the melting of the high purity copper is conducted in vacuum and the casting of the copper with silver is conducted in an argon gas atmosphere; and
3. the melting of the high purity copper is conducted by using a carbon crucible and the casting of the copper with silver is conducted by using a carbon mold.

Regarding the invention of claim 15, Yamazaki allegedly teaches in paragraph [0020] that foreign matter is removed with acid solution or by pickling. However, Yamazaki clearly fails to teach or suggest the aforementioned exemplary features of the claimed invention. Thus, Yamazaki fails to make up for the deficiencies of the alleged Ichikawa and Mae combination features in Section A.

Therefore, Applicants respectfully request the Examiner to reconsider and withdraw this rejection, including those rejections applied to the invention of claims 16, 17, 25, 26, and 31.

IV. FORMAL MATTERS AND CONCLUSION

In view of the foregoing, Applicants submit that claims 12-32, all the claims presently pending in the application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.


Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Attorney's Deposit Account No. 50-0481.

Respectfully Submitted,

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